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STALLMAN & POLLOCK LLP

Attn: Kathleen A. Frost

Suite 2200

353 Sacramento Street

San Francisco, CA 94111

EXAMINER

DHINGRA, RAKESH KUMAR

ART UNIT

PAPER NUMBER

1763

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Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/826,458

Applicant(s)

HANSEN ET AL.

Examiner

Rakesh K. Dhingra

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 03 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 21 November 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 121-145 is/are pending in the application.
- 4a) Of the above claim(s) 121-133 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 134-145 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☒ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 16 April 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 04/04, 07/04.
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Election/Restrictions***

Applicant's election with traverse of invention of Group II (Claims 134-145) in the reply filed on 11/21/05 is acknowledged. The traversal is on the ground(s) that the claimed process can be performed on the claimed apparatus. This is not found persuasive because the apparatus involves use of end effector for moving substrate from lower to upper chamber and thus could be used for materially different process where high order of cleaning and faster speed of operation are involved like in semiconductor wafers treatment. Further as brought out in Restriction requirement, the inventions of group I and II pertain to different classes - process (method) belongs to class 438 and sub-class 745, and the apparatus belongs to class 134, sub-class 95.2 and thus would involve search that would be burdensome.

The requirement is still deemed proper and is therefore made FINAL.

### ***Drawings***

The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description:

- 1) Figure 3A – the drawing does not show end effector 106 as mentioned on page 24, line 4 of the specification;
- 2) Figure 4 – the drawing does not show reference number 120 as indicated in page 24, line 14 of the specification;
- 3) Figure 4 – the drawing does not show reference number 122b as indicated in page 24, line 14 of the specification;

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- 4) Figure 7A - the drawing does not show reference number 106a (end effector) as indicated in page 26, line 4 of the specification;
- 5) Figures 7A-7E – the drawings do not show “alternative chamber 102a” as mentioned on page 25, line 28 of the specification;
- 6) Figure 8 - the drawing does not show reference number Z (zone) as indicated in page 30, line 28 of the specification.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either “Replacement Sheet” or “New Sheet” pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### ***Specification***

The disclosure is objected to because of the following informalities:

- 1) Page 6, lines 5 and 9 - Reference number 26 is referred to as “fluid handling system” in line 5 and as “containment vessel” in line 9;
- 2) Page 24, line 11 – lower opening 135 (Fig. 3B) should be changed to lower opening 135 since reference number 135 is shown only in Figure 3A and not in Figure 3B;

3) Page 25, line 28 – “alternative chamber 102a” is not shown in any of the drawings 7A-7E.

Appropriate correction is required.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

**Claims 134, 135, 137, 141, 143, 145 are rejected under 35 U.S.C. 102(e) as being anticipated by Andreas et al (US Patent No. 6,273,100).**

Regarding Claims 134, 137: Andreas et al teach an apparatus (Figure 1) 1 for treating and drying a substrate, the apparatus comprising:

a chamber proportioned to process at least one substrate 3, the chamber including a submersion chamber (lower portion) 10 and a drying chamber (upper portion) 30;  
a recirculation system (source of process fluid) 40 fluidly coupled to the lower portion of the chamber;  
spray nozzles (source of drying vapor) 33 fluidly coupled to an upper portion of the chamber configured to provide an atmosphere of drying vapor (by means of wall 32, door 57) in the upper portion;  
a wafer conveyor (end effector) 15 movable between the lower portion of the chamber and the upper portion, the end effector operable to withdraw a substrate from process

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fluid in the lower portion 10 into the atmosphere of drying vapor in the upper portion 30;  
and

megasonic transducers 28 positioned to direct megasonic energy into process fluid in the chamber 10 in a direction normal to substrate surface (Column 4, line 40 to Column 6, line 60).

Regarding Claims 135,145: Andrea et al teach (Figure 1) that the megasonic transducers 28 are positioned to form a band of megasonic energy propagating towards a surface of the Substrate 3, wherein the end effector 15 is positioned to move the substrate through the band. Further, it is known in the art that megasonic energy induces thinning of a fluid boundary layer on a portion of the substrate that passes through the megasonic energy band. Andrea et al also teach that (Column 6, lines 10-25).

Regarding Claim 141: Andreas et al teach that drying vapor includes isopropyl alcohol (Column 7, lines 1-10).

Regarding Claim 143: Andreas et al teach that process fluids include deionized water (Column 2, lines 55-60).

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

**Claim 138 is rejected under 35 U.S.C. 102(e) as being unpatentable over Andreas et al (US Patent No. 6,273,100) in view of Fishkin (US Patent No. 6,311,702).**

Regarding Claim 138: Andreas et al teach all limitations of the claim except that direction of megasonic energy is normal to substrate surface.

Fishkin teaches an apparatus (Figures 2A) that comprises a substrate cleaning tank 19a that includes a substrate W, megasonic transducer/focuser assemblies 11sub. 1a, 11sub.1b and a wafer scanning mechanism 29 for up/down vertical movement of the substrate. Fishkin further teaches (Figures 3-5) that angle of transducer/focuser assembly with respect to wafer, and angular coupling between transducer and focuser can be changed as per requirements. Fishkin also teaches that rays from focuser are in the range of 10 –80 degrees (less than normal) relative to wafer surface (Column 4, line 55 to Column 5, line 20 and Column 6, line 10 to Column 7, line 25 and Column 9, lines 1-15).

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Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the required orientation of megasonic energy through control of orientation of megasonic transducer and the focuser as taught by Fishkin in the apparatus of Andreas et al to increase efficiency of the megasonic transducer assembly (Column 2, lines 20-32).

**Claims 136, 139, 142, 144 are rejected under 35 U.S.C. 102(e) as being unpatentable over Andreas et al (US Patent No. 6,273,100) in view of Fishkin et al (US Patent No. 6,328,814).**

Regarding Claim 136: Andreas et al teach all limitations of the claim but do not teach specific speed of moving substrate by end effector through megasonic band.

Fishkin et al teaches an apparatus (Figure 1A) that includes a substrate cleaning and rinsing tank 13, a drying tank 19 and a programmable controller 31 that is coupled to substrate lifting mechanism 17. Fishkin et al also teach that timing of lifting mechanism 17 is linked with the time during which a substrate is cleaned by megasonic energy (Column 4, line 40-50 and Column 6, lines 1-10). Thus time of substrate withdrawal by end effector could be programmed (optimized) as per process requirements.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to program the time of substrate withdrawal by end effector as per process requirements as taught by Fishkin et al in the apparatus of Andreas et al to enable achieve process control.

In this regard courts have ruled (Case law):



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“It is well settled that determination of optimum values of cause effective variables such as these process parameters is within the skill of one practicing in the art. *In re Boesch*, 205 USPQ 215 (CCPA 1980).”

“It would have been obvious to one having ordinary skill in the art to have determined the optimum value of a cause effective variable such as [spray droplet size] through routine experimentation in the absence of a showing of criticality. *In re Woodruff*, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).”

Where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. It would have been obvious to one having ordinary skill in the art to have determined the optimum values of the relevant process parameters through routine experimentation in the absence of a showing of criticality. *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).”

Regarding Claim 139: Fishkin et al teach (Figure 1B) use of hot nitrogen supplied through nozzle (not shown in drawing) to volatilize fluid from surface of substrate.

Fishkin et al also teach that lifting mechanism 17 moves the substrate past the holes for entry of hot nitrogen to accelerate evaporation (Column 5, lines 45-55).

Regarding Claim 142: Fishkin et al teach that apparatus (Figure 1A) includes drying tank 19 whose walls contain a plurality of holes (not shown in drawing) for exhausting residual vapors into an exhaust system (not shown in drawing) [Column 3, line 45 to Column 4, line 13].

Regarding Claim 144: Fishkin et al teach that apparatus (Figure 1a) is proportioned to process one wafer at a time.

### ***Double Patenting***

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the “right to exclude” granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated

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by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 134-142 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 104-112 of U.S. Patent No. 6,726,848.

Although the conflicting claims are not identical, they are not patentably distinct from each other because of following:

1) Claim 104 of the patent teaches the limitation “a chamber proportioned to process only a single substrate” whereas claim 134 in the application recites the limitation “a chamber proportioned to process at least one substrate”. Claim 104 in the patent is narrower<sup>e✓</sup> than claim 134 in the application, and thus claim 104 in the patent anticipates claim 134 in the application;

2) Claim 104 of the patent recites limitation “megasonic energy induces thinning of boundary layer on the substrate” which limitation is included in claim 135 of the application;

3) Claim 139 in the application recites “heated gas fluidly coupled to the chamber to volatilize fluid from a surface of a substrate” whereas claim 109 in the patent recites

"heated gas fluidly coupled to the chamber to volatilize condensed vapor from a surface of a substrate" which are same since "condensed vapor" is also a "fluid".

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

**Fisch et al (US Patent No. 6,276,370)** teach an apparatus (Figures 1a-1c) that includes a vessel 24 and a pair of megasonic transducers 28a, 28b that generate interference waves to clean wafers 22. Fisch et al also teach that high frequencies generated by transducers result in thinning boundary layers on the substrate surface.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rakesh K. Dhingra whose telephone number is (571)-272-5959. The examiner can normally be reached on 8:30 -6:00 (Monday - Friday). If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571)-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Rakesh Dhingra



Parviz Hassanzadeh  
Supervisory Patent Examiner  
Art Unit 1763